

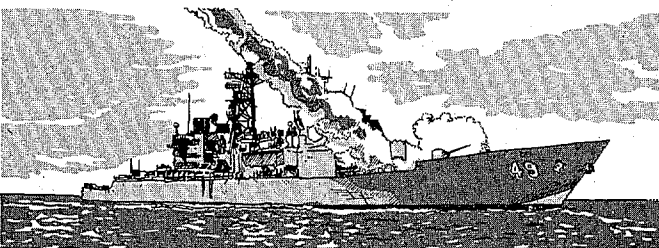
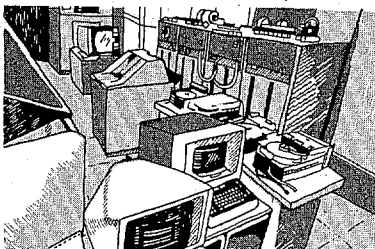
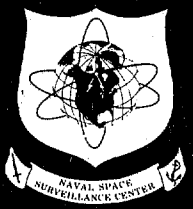
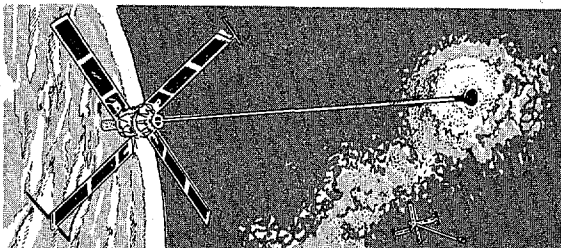
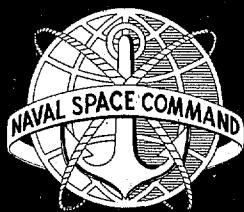
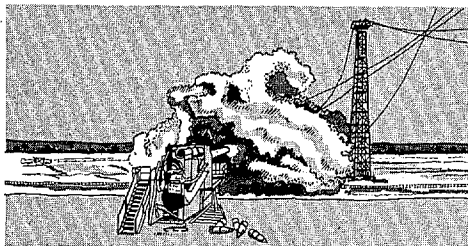


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# 1991 REPORT TO THE COMMUNITY

NAUSWC-MP-91-097



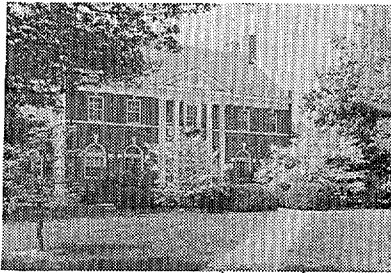
NAVAL SURFACE WARFARE CENTER  
DAHLGREN, VIRGINIA

Report Documentation Page				Form Approved OMB No. 0704-0188	
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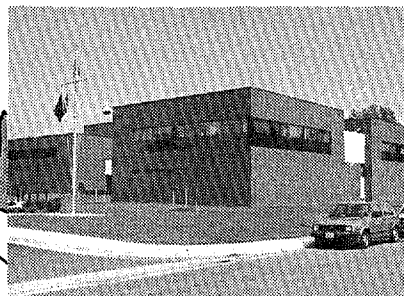
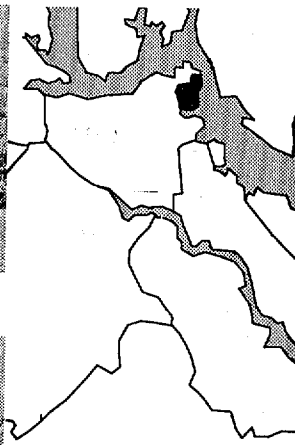
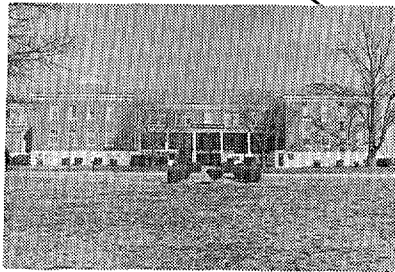
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# What We've Done Together

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## 1991 Report to the Community

Naval Surface Warfare Center  
Dahlgren, VA 22448-5000

25 MARCH 1991

NAVSWC MP 91-97

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## **MISSION**

**To be the principal Navy RDT&E Center for surface ship combat systems, ordnance, mines, and strategic systems support.**

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## WELCOME

For more than 70 years, the Naval Surface Warfare Center (NAVSWC) and its community neighbors in Virginia's Northern Neck and southern Maryland have prospered in a much-treasured partnership that is secured by the common bonds of friendship, patriotism, national defense, and economics. Together, we have a lot to be proud of—this community's military and civilians have emulated the highest standard of outstanding achievement to safeguard America's technological edge.

The history of the past seven decades has been punctuated by certain and steady progress for both the installation and its community neighbors as NAVSWC grew from a small proving ground for testing naval guns to one of the largest research and development (R&D) centers in the United States. The history of the future is certain to be punctuated by the hopes and dreams of even more steady progress as NAVSWC excels to its missions *to be the principal Navy RDT&E Center for surface ship combat systems, ordnance, mines, and strategic systems support.*

NAVSWC (formerly the Naval Surface Weapons Center) was established in 1974 with the merger of the Naval Ordnance Laboratory (NOL) at White Oak, Maryland and the Naval Weapons Laboratory (NWL) at Dahlgren, Virginia. This consolidation of human resources, facilities, and research, development, test, and evaluation (RDT&E) in support of the Fleet enhances the tradition of excellence at each laboratory.

Dahlgren, the Center's headquarters, has a land area of 4300 acres that includes Potomac shoreline and a 25-mile downriver range for

projectile testing. White Oak encompasses 730 acres. The two sites offer unique test facilities (e.g., anechoic chamber, hydroballistics tank, magnetic ships facilities, etc.). NAVSWC operates major field activities (Ft. Lauderdale, Florida, Wallops Island, Virginia; and Ft. Monroe, Virginia) where hardware is tested and evaluated under conditions that simulate those encountered at sea.

The industrially funded Center performs technical support for customers in the Navy and other defense activities that need technical products and services for ship combat systems, ordnance, naval mines, and strategic systems. NAVSWC, with its primary mission in surface warfare, complements other Navy facilities that have primary missions in air warfare, underwater warfare, naval vehicles, etc.

NAVSWC has the diverse and complex mix of facilities required to support R&D projects: chemistry, plastics, metallurgy, and explosives laboratories; hydroballistic, hydroacoustic, and aerodynamic facilities; electromagnetic and environmental simulation facilities; and combat/weapon systems integration and evaluation facilities.

The Center is responsible for Navy-wide leadership in the following areas: surface ship combat systems engineering and integration; surface warfare analysis; surface ship electromagnetic/electro-optic reconnaissance and search systems; surface ship gun and missile systems; mine, torpedo, projectile, and missile warheads; surface ship electronic warfare; Navy strategic systems targeting, fire control, and reentry systems; mines, nuclear weapons effects, and surface ship biological and chemical warfare systems; directed energy weapon systems; explosives (principally research); and mine, torpedo, and projectile fuzes.

Under the joint leadership of a military Commander and a civilian Technical Director, NAVSWC's work draws on many disciplines to help advance the technologies and innovations that will be required for the future.



**CAPT ROBERT P. FUSCALDO, USN**  
**COMMANDER**  
**NAVSWC**

CAPT Robert P. Fuscaldo assumed command of NAVSWC on 30 June 1988 following a tour as Deputy Program Manager for the AEGIS Shipbuilding Program, Naval Sea Systems Command (NAVSEA). A native of Tuckahoe, New York, he entered the U.S. Navy through the NROTC program at the University of Notre Dame, where he earned a Bachelor of Science degree in chemical engineering in 1961. He is also a graduate of the U.S. Naval Postgraduate School (ordnance engineering) in Monterey, California and the Industrial College of the Armed Services at National Defense University.

CAPT Fuscaldo's early Navy experience included tours aboard amphibious ships and destroyers where he participated in wargaming and Antisubmarine Warfare operations with Hunter-Killer Group Alpha. He also served in the Bureau of Naval Personnel Training Directorate. In 1967 and 1968, CAPT Fuscaldo

commanded a river patrol boat squadron in Vietnam that operated primarily on the rivers and canals of II and IV corps. He later served for 27 months as Damage Control Officer aboard USS KITTY HAWK (CV 63), which was deployed during much of that time to Yankee Station off the coast of Vietnam.

In 1972, he reported to the Naval Weapons Support Center (NWSC), Crane, Indiana as Director of Ordnance, responsible for weapons production. CAPT Fuscaldo then returned to sea, commanding USS KISKA (AE 35), which was the Navy's newest ammunition ship.

Following his first tour of duty at NAVSWC, Dahlgren as Assistant for Military Applications in the Weapons Systems Department, he served as Assistant Chief of Staff for Operations to Commander, Surface Group, Western Pacific (CTF 73 and 75) in the Philippines. There he was responsible for the operations of 77 ships and coordinated activities concerned with Fleet exercises, battle readiness, logistics, and training. These operations extended from the Persian Gulf to the International Dateline and from the Sea of Okhotsk to Australia. In 1983, as Executive Assistant to Commander, Naval Sea Systems Command, he took part in getting the new DDG 51 ARLEIGH BURKE class approved.

CAPT Fuscaldo's decorations include the Bronze Star with Combat V; the Meritorious Service Medal (three awards); the Navy Commendation Medal with gold star; Combat Action Ribbon, Presidential Unit Citation; Navy Unit Citation (three awards); and various service and campaign ribbons.

CAPT Fuscaldo and his wife, the former Barbara Bond of Fond du Lac, Wisconsin, reside in Dahlgren, Virginia with their children, Jason, Elizabeth, Jared, and Robert Joseph.



**DR. THOMAS A. CLARE**  
**TECHNICAL DIRECTOR**  
**NAVSWC**

Dr. Thomas A. Clare was named Technical Director of NAVSWC on 27 February 1989. Previously, Dr. Clare headed the Center's Engineering and Information Systems Department and chaired the Finance and Business Systems Resource Board.

A native of New York, Dr. Clare began his career as an aeroballistics engineer at the Naval Weapons Laboratory (NWL), Dahlgren, Virginia (now NAVSWC) in 1967. He holds bachelor's and master's degrees in aerospace engineering from the University of Notre Dame and completed his doctorate there in 1970.

Dr. Clare was selected to head the Center's Aeromechanics Branch in 1973. Two years later, he was named Head of the Exterior Ballistics Division. From 1975 to 1976, Dr. Clare served as Science Advisor to Commander,

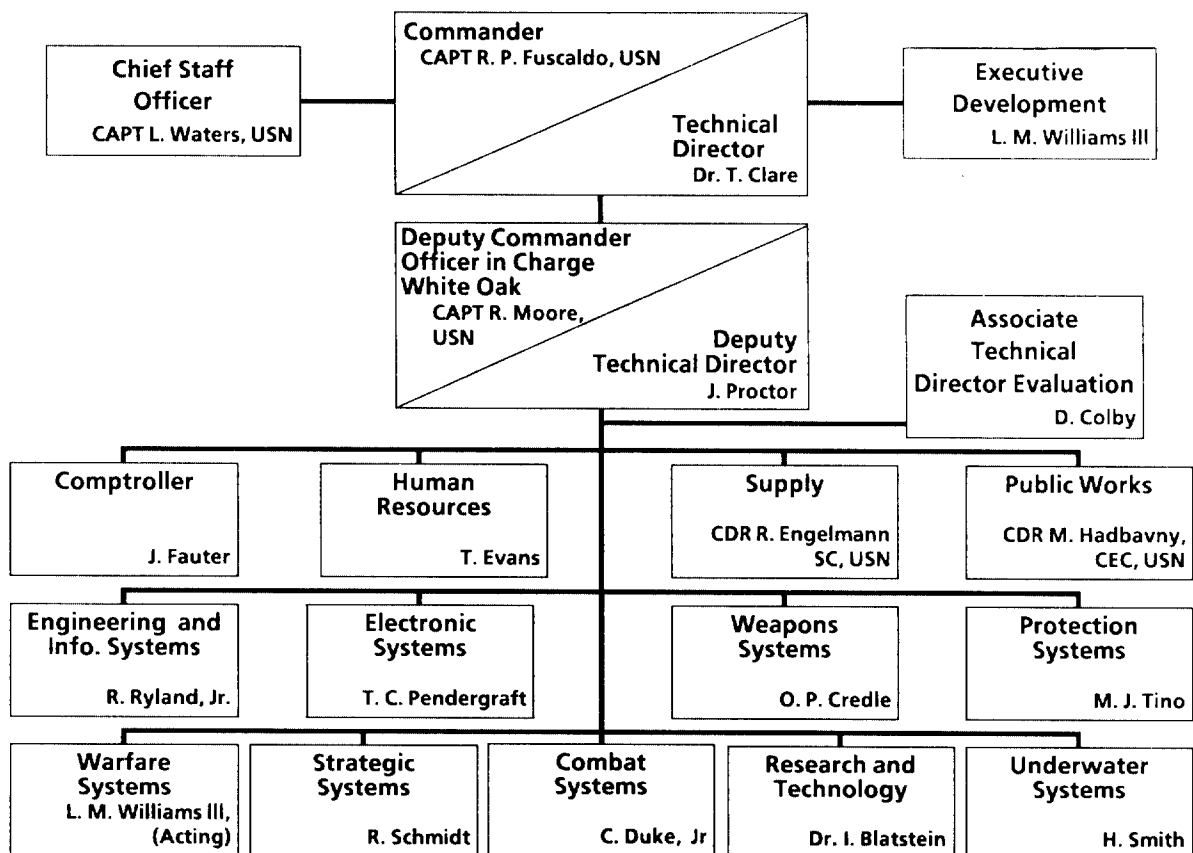
Naval Surface Force Atlantic in Norfolk, Virginia.

Upon returning to NAVSWC, Dr. Clare headed the AEGIS Ship Combat Systems Division until he was named Deputy Head of the Center's Electronics Systems Department in 1979. Subsequently, he headed the Combat Systems and the Strategic Systems Departments before moving to the Engineering and Information Systems Department.

Dr. Clare has received numerous awards and commendations during his career. He received the Department of the Navy Superior Civilian Service Award in 1986 and the Presidential Rank of Meritorious Executive in 1990. He has published more than 30 papers in refereed journals or at national symposia.

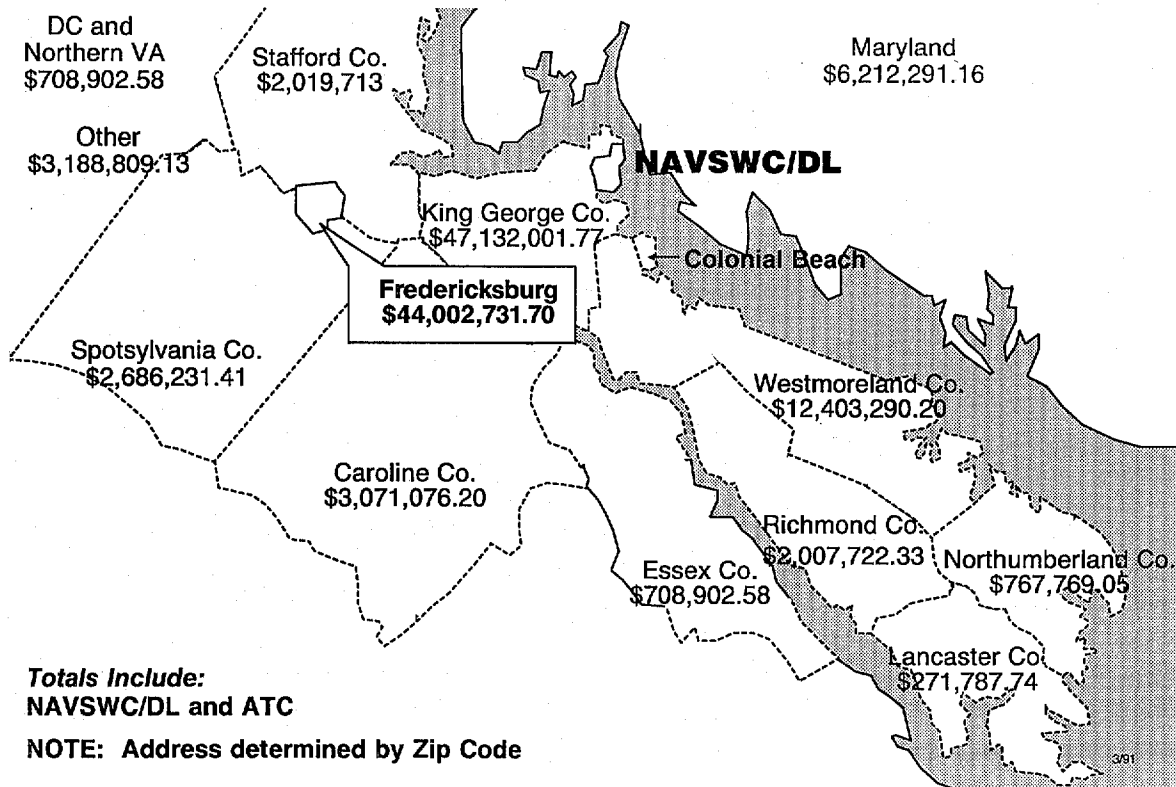
Dr. Clare resides in Fredericksburg, Virginia with his wife, Rose Mary, and son, Todd, a high school student. Son Tom is a student at the University of Notre Dame.

## NAVSWC'S ORGANIZATIONAL CHART (MARCH 1991)





## PAYROLL DISTRIBUTION (9/30/90)



## PEOPLE—OUR MOST IMPORTANT RESOURCE

### PERSONNEL ONBOARD (1/31/91)

Military	Site		Total
	WO	DL	
Officers	8	26	35
Enlisted	19	70	89

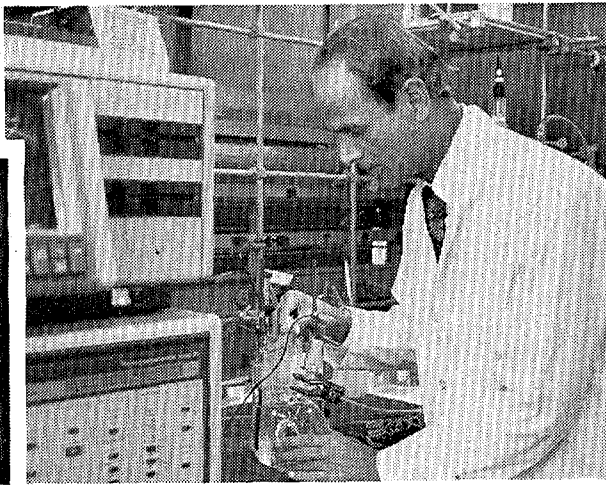
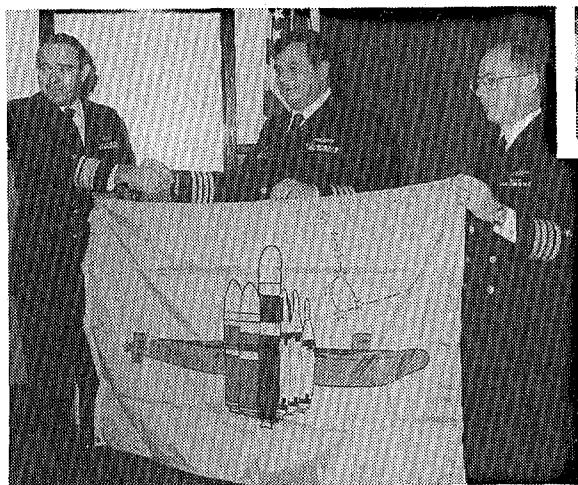
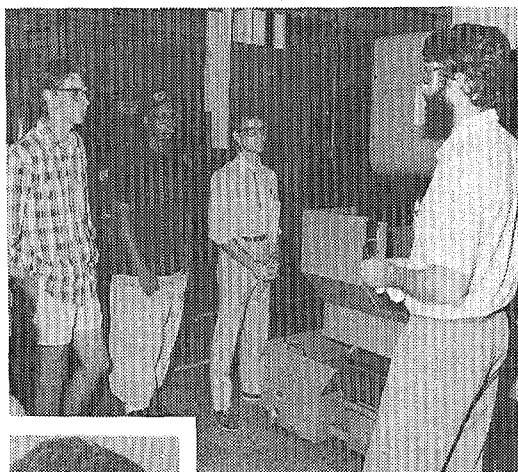
Civilian	FTP			Other*		
	WO	DL	Total	WO	DL	Total
Scientific and Engineering	1048	1620	2668	21	16	37
Other Professional	18	57	75	0	3	3
Management and Administrative	183	409	592	7	9	16
Scientific and Engineering Technician	153	257	410	3	1	4
Technicians	86	215	301	3	5	8
Clerical	138	275	413	12	9	21
Other General Schedule	27	56	83	15	29	44
Ungraded	155	293	448	10	18	28
<b>TOTAL</b>	<b>1808</b>	<b>3182</b>	<b>4990</b>	<b>71</b>	<b>90</b>	<b>161</b>

Other Than Full-Time Permanent (FTP) Employees in Pay Status

### SCIENTISTS AND ENGINEERS BY DISCIPLINE (FTP) (1/31/91)

Discipline	Site		Total
	WO	DL	
General Engineering	92	62	154
Mechanical and Aerospace Engineering	228	234	462
Electrical and Electronics Engineering	335	396	731
Chemistry and Chemical Engineering	74	10	84
Physics and Physical Science	131	173	304
Math and Operation Research Analysis	61	351	412
Computer Science/Engineering	71	345	416
Other	56	49	105
<b>TOTAL</b>	<b>1048</b>	<b>1620</b>	<b>2668</b>

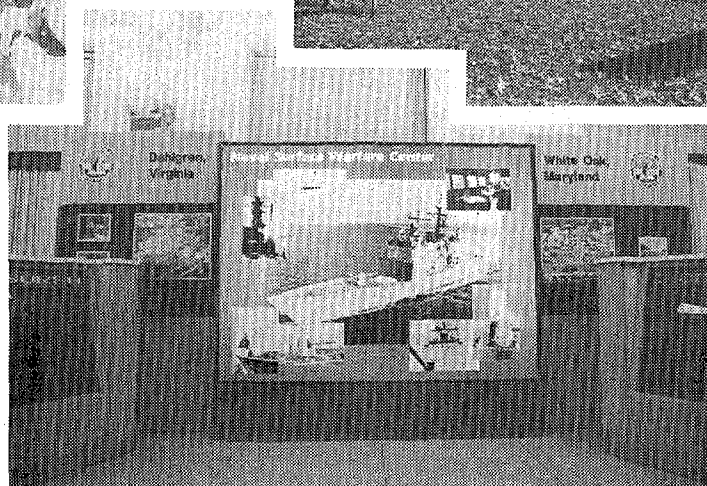
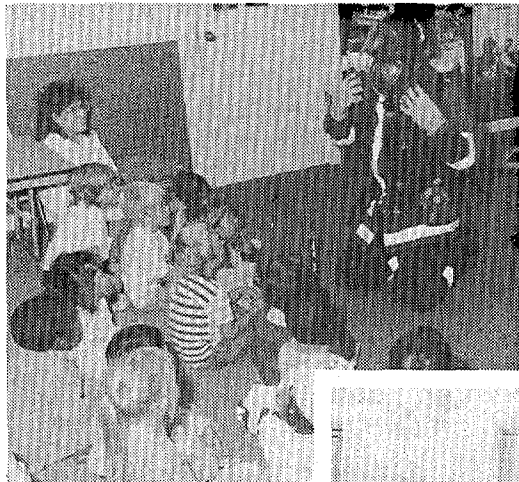
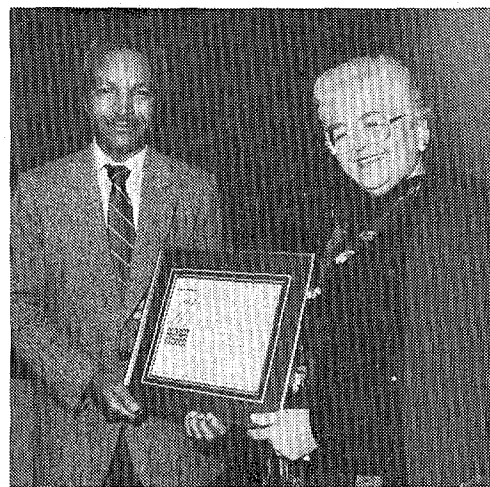
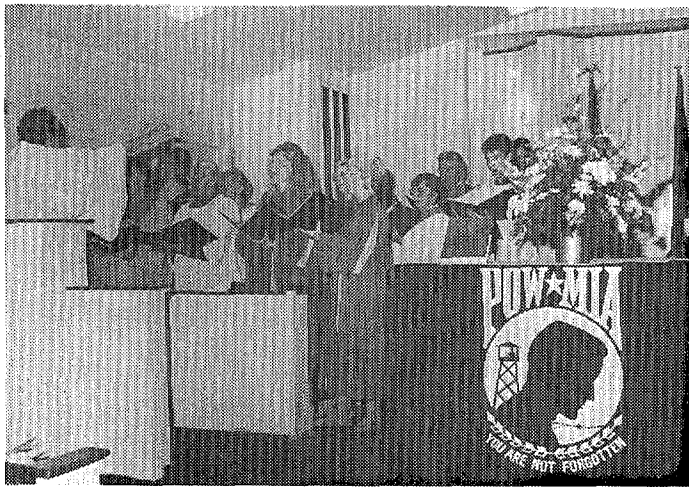
**TECHNOLOGY MAY BE THE KEY TO THE FUTURE,  
BUT OUR PEOPLE ARE THE KEY TO TECHNOLOGY!**



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## NEIGHBORS WORKING TOGETHER

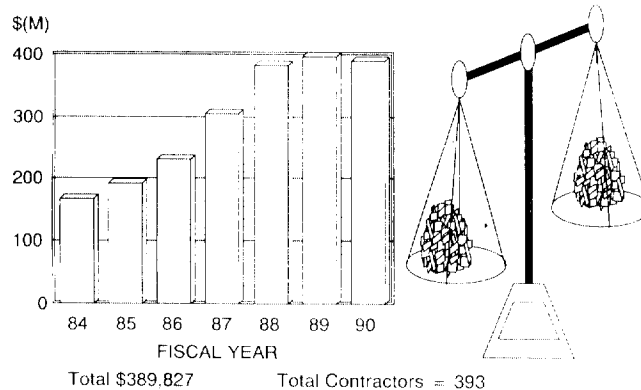




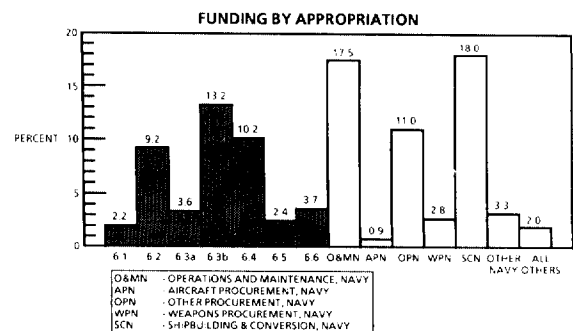
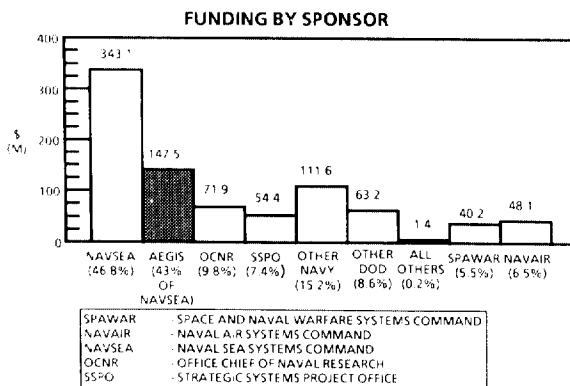
## CONTRACTS AND PURCHASES (FY90) AT DAHLGREN

<b>Total</b>	<b>\$257M</b>		
<b>Awarded</b>	<b>\$182M</b>	<b>To Disadvantaged Businesses</b>	<b>\$34M</b>
In Virginia	\$141M	In Virginia	\$24M
In Maryland	\$41M	In Maryland	\$10M
<b>To Small Businesses</b>	<b>\$58M</b>	<b>To Women-Owned Businesses</b>	<b>\$411M</b>
In Virginia	\$41M	In Virginia	\$271M
In Maryland	\$17M	In Maryland	\$140M

## CONTRACT TRENDS



## SOURCE OF FUNDS (FY91) ESTIMATED \$733.9

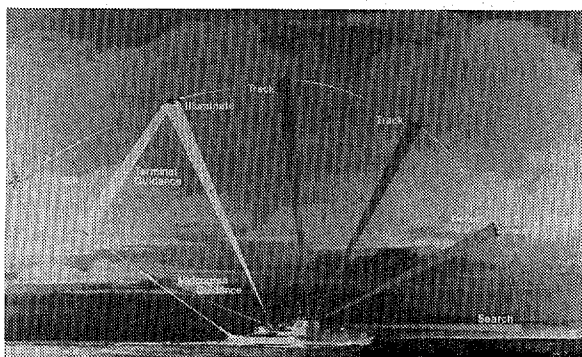




## NAVSWC'S MAJOR ACCOMPLISHMENTS (FY89 - 90)

### Combat Systems

- Development and Fleet introduction of a major upgrade of the AEGIS Combat System for cruisers CG 52 - CG 55, system design for the next-generation AEGIS Combat System for cruisers CG 47 - CG 51, and a definition, design, and engineering development plan for an Advanced AEGIS Weapon System Simulation have been completed. The AEGIS Display System map-generation capability has been upgraded.

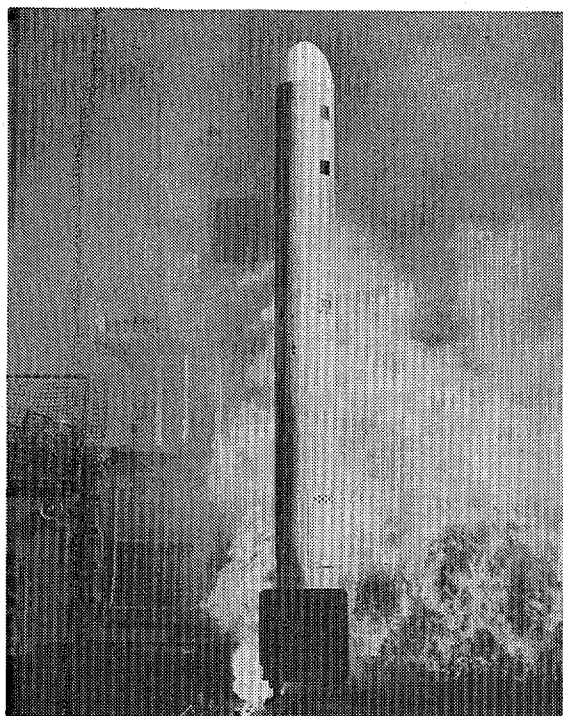


*AEGIS engagement sequence*

- Land-based testing at Wallops Island to define the current state of performance of the NAVSWC-developed RAIDS prototype when integrated with actual terminal defense systems and exposed to realistic threat environments has been successfully completed. The large quantity of test data extracted formed the basis for RAIDS prototype evaluation and provides realistic tactical data for future hardkill/softkill development and analyses.
- The Office of Naval Technology (ONT) established a NAVSWC-proposed 6.2 Block Program entitled *Engineering of Complex Systems*. This futuristic program address-

es significant issues in the design and engineering of large-scale, complex, computer-intensive systems. The program structure includes theory, critical prototypes, application prototypes, and transition opportunities for major programs (e.g., AEGIS, TRIDENT, TOMAHAWK, and SQQ-89).

- An IED project for a High-Speed parallel Backplane (HSPB) that investigated a novel approach to parallel backplane design was completed. This design effort has resulted in the development of a cylindrical backplane prototype and experimental verification of its superior performance characteristics. The HSPB project was selected by ONT for their published list of the most significant accomplishments within the tech base that they manage.



*TOMAHAWK Cruise Missile*

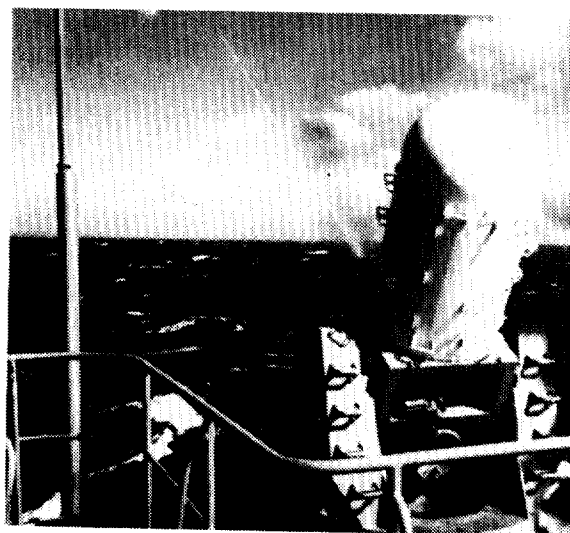
- The development of Block IIA TOMAHAWK Weapon Control System (TWCS) software for the Block II TOMAHAWK Missile test firings was completed; support for Fleet introduction of the TWCS Block II Upgrade was provided; software maintenance build for TWCS Block I was developed; and the Long-Range Conventional Standoff Weapon (LRCSW) advanced development program was supported.

## Electronic Systems

- An upgraded AN/SLQ-32(V) software load required for Persian Gulf operations was designed, developed, tested, and delivered in record time (less than one month).
- A personal computer (PC)-based threat library generation system for the AN/SLQ-32(V) was developed. This system allows classified threat data transfer between NAVSWC and Fleet ELINT Centers via STU III telecommunications and enables automatic threat library building. The time required to reprogram threat libraries in the Fleet during crisis situations is reduced from days and weeks to hours using this system.
- A Preliminary Design Review (PDR) was conducted for the NULKA Fire Control System (NFCS). The NFCS design was jointly reviewed by NAVSEA and Royal Australian Navy representatives. NFCS, which will control deployment of the NULKA decoy, is being developed in-house using Ada programming language.
- A concept for an infrared sensor of unprecedented sensitivity that would provide detection of low-signature Antiship Missile Defenses (ASMDs) at the horizon has been developed.
- High-energy switch technologies that will aid the development of rep-rated pulsed-power systems needed to power CPB wea-

pons have been developed and demonstrated.

- Infrared (IR) and television (TV) track with the PHALANX Close-In Weapon System (CIWS) was demonstrated when an AN/KAS-1 Forward-Looking Infrared (FLIR) sensor and a Charge-Coupled Device (CCD) TV were integrated with the CIWS radar.



*PHALANX Close-In Weapon System (CIWS)*

## Engineering

- In support of NASA and the Presidential Commission's recommendation to remove the external tank destruct system (investigation of the Challenger accident), a Range Safety Destruct Analysis of Space Shuttle Solid Rocket Boosters was conducted. Data for Range Safety destruct criteria and risk analyses for Space Shuttle nuclear payloads were provided.
- Continued automation of the Technical Library, photographic processing (Ilford Cibacopier), video, Xerox 6085 system (upgrade), and Autographix color graphics has resulted in improved quality and turn-around of products accompanied by lower costs and reduced staffing requirements.



- Under an approved DoD Productivity Investment Fund project, renovation and modernization of the Engineering Prototype Fabrication Facility has been completed.

## Protection

- Nuclear safety analysis and testing of TOMAHAWK and Vertical Launching System (VLS) computer programs for the Block II Upgrade that lead to nuclear certification of the system and Fleet deployment were completed.
- The first EMPRESS II trial of a Navy Combatant was successfully conducted on USS DEYO (DD 989) in the VACAPES OP Area during July 90. EMPRESS II is a new \$50M floating simulator designed to test ships to the effects of a high-altitude nuclear electromagnetic pulse (EMP).



USS DEYO (DD 989)

- The technology development of the Closed-Loop Degaussing Concept for Mine Countermeasures Ships in the areas of algorithms, sensors, and computer simulation of ship magnetic fields was completed.

Negotiated with France (under the Nunn Amendment) to establish a Memorandum of Understanding for the Advanced Development of Closed-Loop Degaussing for Mine Countermeasure Vessels.

- The problem of uncommanded initiation of FLU-8A/P life vest inflation devices on the decks of several aircraft carriers and while aircraft were in flight was successfully identified and solved.

## Strategic Systems

- The Initial Operational Capability (IOC) of the TRIDENT II Weapon System with NAVSWC-developed Fire Control and Targeting software and data was supported.
- IOC PHASE I Part 1 of TRIDENT I and TRIDENT II Submarine-Launched Ballistic Missile (SLBM) Retargeting System with NAVSWC-developed Fire Control and Targeting software was supported.
- Initial UK TRIDENT II Operational Fire Control software in support of the UK TRIDENT Training Facility and Operational Support and Analysis software in support of the UK Software Facility were delivered.
- Major milestones in Advanced Distributed Processing Technology (ADPT), which included the application of ADPT to a global antisatellite (ASAT) simulation system and the development of an advanced combat system simulation, were completed.
- PC-based near real-time orbit determination software that could benefit several important programs that involve space systems was developed and demonstrated.

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## Technology

- The world's first revolutionary automated reinforced lead-acid submarine battery grid-casting machine was successfully developed. Reinforced grids will extend the life of batteries used aboard submarines from the current five years to ten years and will increase the fracture toughness of the grid.
- Based on in-house and field testing experiments, a new conductive caulk to prevent corrosion in SPY-1A arrays was recommended for AEGIS ships. The cost savings associated with preventing corrosion is estimated to be \$50M.
- The control of chaos in a magnetoelastic buckling ribbon experiment was successfully demonstrated. This method, which requires no *a priori* knowledge of the dynamics, has potential for control of chaotic vibrations in a wide variety of systems.
- A new understanding of the relationship between graphite fiber surface and graphite composite material strength was formulated, which could lead to the manufacture of graphite composites with very high transverse strengths.
- Underwater explosion testing of experimental explosive compositions for advanced bulk charge warheads has revealed gains of 20 percent in Relative Bubble Effectiveness (RBE) over currently used explosives.
- An alternate synthesis step for the new explosive CL-20 has been identified that will reduce the cost to produce it. In addition, the compatibility of CL-20 with state-of-the-art explosive binders has been determined, which indicates that formulation of a CL-20 -based explosive is feasible.

## Underwater Systems

- A functional design baseline for AN/SQQ-89 was developed; the AN/SQQ-89 was integrated and tested for use aboard the naval combatants CG 57 – CG 65 and DDG 51. Two formal software releases of the special test equipment (STE) to provide external test drivers to AN/SQQ-89 were completed.
- The preparations for assuming Life-Cycle Engineering Support of the Mk 116/Mod 7 Antisubmarine Warfare (ASW) Control System was completed.
- Operational Evaluation (OPEVAL) for the Mk 16 Tail was passed and approval for limited production was received. The Mk 16 Tail provides high-speed low-altitude delivery for Mk 36 DESTRUCTOR and Mk 62 QUICKSTRIKE Mines.
- The Computer-Assisted Test and Evaluation System (CATES), which allows automated Class A testing of QUICKSTRIKE Target Detection Devices, was developed. It performs testing in several hours that previously required a day and a half at the manufacturer.
- The torpedo Mk 50 warhead system EX 122 passed the Critical Design Review (CDR) and OPEVAL and is scheduled to enter the Fleet in 91. Its effectiveness has been conclusively demonstrated by a comprehensive series of full-scale tests that simulate a wide variety of targets under static and dynamic conditions.

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## Warfare Systems

- In May 90, NAVSWC established the Warfare Systems Department to support the Director of Naval Warfare in master plan efforts, future naval warfare requirements analysis, the establishment of conceptual warfare initiatives with respect to potential warfare scenarios, and the definition of platform and weapon requirements that must be satisfied within those scenarios.

## Weapon Systems

- Qualification of the STANDARD Missile (SM) Mk 115 Mod 1 Warhead for service use was completed. This Mod provides a replacement explosive for the Mod 0 that used explosive ingredients that are no longer available; it will be used in the EX 125 Warhead.
- DT III for TOMAHAWK/VLS was completed, which permits deployment of the VLS 581A to the Fleet. This software integration test demonstrated compatibility between VLS and the TOMAHAWK Weapons Control System.
- Mk 34 AEGIS Gun Weapon System with certified software was delivered to DDG 51 and DDG 52.
- CDRs for the EX 125 Advanced Warhead and the AN/DKT-71 Encryption Telemeter were successfully completed. They provide greatly improved capabilities for the SM.
- The CDR for the VLS changes for implementing the SM Block IV Missile was completed.
- Concept demonstration models (hardware and software) of a modular, man-portable system to support USMC Forward Ob-

servers and Forward Air Controllers in the detection, identification, and location of targets have been developed and demonstrated. A prototype of an automated digital communications capability that can be embedded in the system to significantly increase the speed and accuracy of the transmission of targeting data has also been developed.

- Qualification of the Mk 403 Mod 1 Time/PD, Mk 399 Mod 1 PD/Delay, and Mk 417 Mod 1 Proximity Fuzes for use in selected Navy gun ammunition has been completed.

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## NAVSWC PROGRAMS SUPPORTING DESERT STORM



### AEGIS

The AEGIS Combat System is an integrated array of weapons and sensors that enables an AEGIS ship to handle any enemy threat from air, on sea, and under sea. At the core of the combat system is the AEGIS Weapon System Mk 7 that provides primary defense against missiles and aircraft. The system is based upon the SPY radar that automatically detects and tracks virtually everything that is flying out to beyond 200 miles.

NAVSWC has two primary roles relating to AEGIS:

- Technical Direction Agent—Responsibilities in Combat System Engineering
- Lifetime Support Engineering Agent—Computer program development for the system and several components and a variety of other acquisition and engineering support functions

Throughout the *DESERT SHIELD* and *DESERT STORM* operations, NAVSWC has carried out a number of tasks aimed primarily at *fine tuning* the AEGIS ships for the particular set of enemy threats found in the Persian Gulf area. This *fine tuning* also involved adjustment for the peculiarities of the Persian Gulf environment. These efforts have involved several trips to that area by NAVSWC and contractor personnel to gather data, install computer programs, brief crews, and perform various other tasks.

### Chemical/Biological Warfare Defense

NAVSWC is the Navy's lead laboratory for work in the area of defense against chemical and biological warfare. Since Iraq has (and is known to have used) this type of weapon, we have played a major and very important role in the Navy and Marine Corps operations in the Persian Gulf area.

NAVSWC has assisted our forces in analyzing and understanding the nature of the threat and in understanding and predicting the nature of possible attacks. In some cases, we have provided special equipment and training to SEAL, EOD, and other Navy and Marine Corps special units. We have provided decontamination and casualty handling training to Fleet medical personnel. Also, we have made sure that our civilians going to the Persian Gulf have been properly trained and equipped.

NAVSWC is frequently called upon for consultation and advice and to represent the Navy in joint efforts in this area.

## Electromagnetic Compatibility

Modern military operations rely heavily on a vast array of electromagnetic equipment, transmitters, and receivers. If not carefully designed and protected, these electromagnetic devices can interfere with each other, which creates severe safety and operability problems. NAVSWC is widely recognized for its expertise and specialized equipment for detecting, identifying, and solving electromagnetic compatibility problems.

NAVSWC assisted several ships operating in the Persian Gulf that were experiencing problems (or potential problems) of an electromagnetic compatibility nature: USS THEODORE ROOSEVELT, USS MOOSBRUGGER, and USS LASALLE. Support has also been provided for certain aircraft systems and certain land-based equipment.

## Electronic Warfare

NAVSWC provides research, development, testing, and operational support for the electronic warfare systems onboard surface Navy ships. These systems provide protection for our ships against antiship missiles and provide countermeasures to deny missile launch information to the missile launching platforms. The Center is the primary Navy Laboratory in this important element of naval warfare.

Electronic warfare equipment and techniques have been heavily employed in *DESERT STORM*. NAVSWC has played a major role in assisting the U.S. Fleet, the Marine Corps, and some of the allied forces; e.g., we upgraded certain software to enhance the electromagnetic countermeasures capability and delivered it to ships in the Persian Gulf area, developed and delivered certain software to the Atlantic Intelligence Command, developed and delivered special decoy systems to support the Marine Corps, and provided updated threat information to the Saudis.

## Explosives/Warheads

NAVSWC has a major leadership role in Energetic Materials R&D and Undersea Weapons Warhead Technology. We have extensive explosives chemistry laboratories and facilities that include a 50-pound explosive test chamber. NAVSWC developed most of the Navy Plastic Bonded Explosives (PBXs) currently in use.

Virtually all of the weapons being used by the Navy in the *DESERT STORM* operation and some of the weapons used by the other services contain explosives developed by NAVSWC.

## Guns

NAVSWC has Navy-wide leadership on surface ship gun systems. Our recent work has included developing an Extended-Range Projectile, Gunfire Control System, and other support services for the 16-Inch Guns that have been used so successfully by the battleships WISCONSIN and MISSOURI in the *DESERT STORM* operation. We have also provided lethality and effectiveness information to help defeat Iraqi patrol boats and other equipment.

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## Mines

NAVSWC is the Navy's principal technical agent for mine systems. Since the founding of the White Oak site in 1918 (Mine Laboratory), we have been the Design Agent or Technical Development Agent for all of the mines in the Navy's inventory.

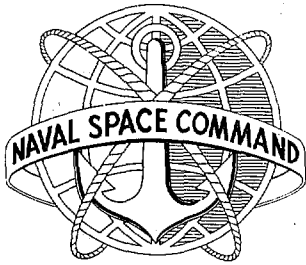
In a related program area, we also develop certain weapons and equipment for the SEALS.

In the *DESERT STORM* operation, NAVSWC helped improve the Fleet's ability to deal with enemy mines and provided certain assistance to the SEALS, which included information on how to defeat the guided missile patrol boats Iraq captured from Kuwait.

## Missiles

NAVSWC is the principal Navy activity for research, concept definition, development, integration, test, and evaluation of surface ship-launched missile systems. This leads to a variety of roles on several missile systems; e.g., we are the Principal Support Laboratory for TOMAHAWK Cruise Missile Weapon Systems with primary emphasis on software development and systems engineering for Weapons Control Systems.

The major contribution made by TOMAHAWK to *DESERT STORM* has been widely reported by the television and print media. NAVSWC and its contractors have played important roles in the success of this system.



## NAVAL SPACE COMMAND (NAVSPACECOM)

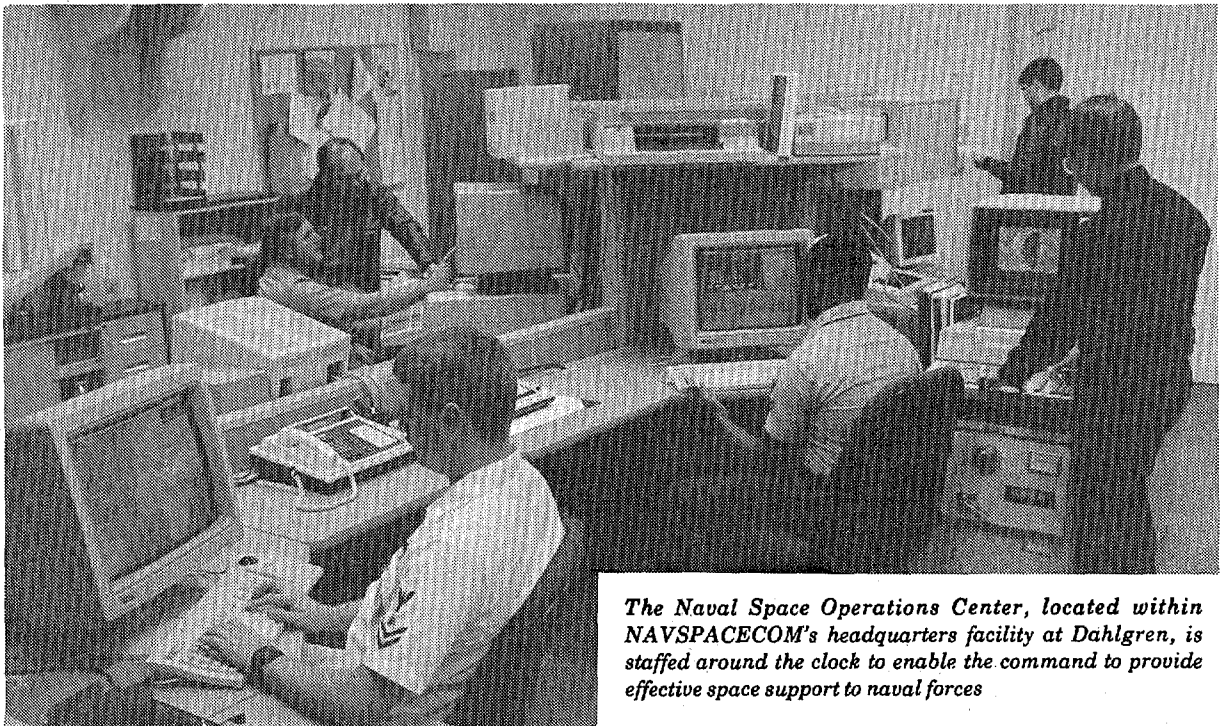
### Exploiting the High Ground

As the first U.S. Carrier Battle Groups converged on the Middle East in response to Iraq's invasion of Kuwait on 2 August 90, NAVSPACECOM had already begun mobilizing a wide array of space-based resources to support what would come to be known as operation *DESERT SHIELD* and, later, operation *DE-SERT STORM*.

With direction from NAVSPACECOM, critical communications satellite systems were reconfigured to improve command and control. Using tactical intelligence derived from a number of space resources, NAVSPACECOM began transmitting up-to-the-minute reports on the changing threat directly to the Battle Group commanders.

Components of the 2nd Marine Aircraft Wing deployed to the Persian Gulf area worked with NAVSPACECOM to become the first U.S. military forces to use a new class of lightweight communications satellites for dedicated operational support.

To provide Navy and Marine Corps forces in the theater with an up-to-date tactical picture of the region's desert topography, beach-heads, and force deployments, NAVSPACECOM assisted U. S. Central Command in collecting and distributing critical environmental data from earth-imaging satellites.



*The Naval Space Operations Center, located within NAVSPACECOM's headquarters facility at Dahlgren, is staffed around the clock to enable the command to provide effective space support to naval forces*

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Before USS DWIGHT D. EISENHOWER and USS INDEPENDENCE and elements of their Battle Groups arrived in the theater, NAVSPACECOM had ensured that the *high ground* of space was offering a complete spectrum of operational support to deployed tactical commanders.

Established by the Secretary of the Navy in 1983, NAVSPACECOM is today the center-point of Navy and Marine Corps operational efforts to provide responsive tactical space systems support to deployed naval forces. The command operates as both the naval component of the United States Space Command and as a second-echelon command reporting to the Chief of Naval Operations and the Commandant of the Marine Corps.

Without a doubt, space is a vital *high ground* to tactical elements of our naval forces. In it, we have deployed satellites that provide crucial intelligence, communications, navigation, and environmental information to the Fleet and Fleet Marine Force to *make every shot count*. NAVSPACECOM is in place to strengthen operational control, provide a central focal point for naval space matters, and more effectively guide our future operational uses of space.

NAVSPACECOM's mission, as the CINCSpace naval component, is to support day-to-day operations of the Fleet and Fleet Marine Forces worldwide, whether for routine deployments, exercises, or actions in response to a crisis situation. At the center of that support is the headquarter's Naval Space Operations Center. Equipped with state-of-the-art communications and data-gathering equipment, this unique Navy facility is staffed 24 hours a day to enable the command to monitor space activities in support of naval operations around the clock.

NAVSPACECOM occupies a critical role in the Navy's newly promulgated Space and Electronic Warfare (SEW) area. RADM L. E. Allen, Jr., says that *NAVSPACECOM is a key link to the Fleet in providing space-related SEW*

*support. We are evolving into a fusion center for all space assets; we are able to offer Fleet and Fleet Marine Force commanders 'one-stop shopping' for space products critical to the success of their operations.*

NAVSPACECOM's primary challenge for the coming decade and beyond is to continue to provide effective space support to the naval warfighter. The command's initiatives will include identifying space system requirements, developing operational concepts, and operating space systems in a way that more fully integrates them into weapon systems to make space a more effective tool for the naval warfighter.

Space systems are among those that make up the SEW commander's arsenal, which is vital to the Fleet's ability to fight and win. The SEW commander will focus space support into the Fleet in the form of space-based sensors and as a conduit for information. NAVSPACECOM will link with SEW commanders to focus global space capabilities on each SEW commander's tactical area of responsibility.

Focusing naval, DoD, and national space assets on each Battle Group's tactical situation will greatly enhance and extend the Fleet's offensive capabilities. NAVSPACECOM has the connectivity and trained staff to provide responsible space support to the SEW commander to put *crosshairs on target* for the Fleet of today and of the future.



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## MANPOWER (DAHLGREN AREA)

	FY90	FY91	FY92
<b>Headquarters</b>			
Military	41	44	44
Civilian	49	47	45
<b>NAVSPASUR</b>			
Military	102	144	175
Civilian	139	139	129

## O&MN FUNDING (\$M AS OF 1991)

	FY90	FY91	FY92
	Actual	Budget	Budget
<b>Headquarters</b>	6.6	5.7	5.1
<b>NAVSPASUR</b>	15.5	15.5	15.4
<b>Navy Astronautics</b>			
Group	6.4	6.0	5.6
<b>Fleet Operations</b>			
Support	26.3	27.1	27.7
<b>Telecommunications,</b>			
<b>Command, and</b>			
<b>Control</b>	7.2	59.9	49.9
<b>Total O&amp;MN</b>	<b>62.0</b>	<b>114.2</b>	<b>103.7</b>

## BREAKDOWN OF O&MN COSTS (\$M AS OF 1991)

	FY90	FY91	FY92
	Actual	Budget	Budget
<b>Headquarters</b>	2.2	2.1	2.1
Civilian Personnel	0.5	0.2	0.4
Facilities Operations			
and Maintenance	3.9	3.4	2.6
<b>Total</b>	<b>6.6</b>	<b>5.7</b>	<b>5.1</b>



**RADM L. E. ALLEN, JR., USN**  
**COMMANDER**  
**NAVSPACECOM**

RADM Ed Allen was born in Houston, Texas, on 19 November 1943. After graduating from the University of Texas in May 1965, he was commissioned in March 1966 under the NAOC program and designated a Naval Flight Officer in December 1966.

RADM Allen commanded Fighter Squadron VF-1 from February 1980 to June 1982 and Carrier Air Wing TWO from December 1984 to November 1985. During his air wing command, he flew in the F-14A, A-6E, SH-3, E-2C, S-3A, and EA-6B. He then commanded the amphibious assault ship USS VANCOUVER (LPD 2) from June 1986 to February 1988 and the aircraft carrier USS CORAL SEA (CV 43), the *Ageless Warrior*, from June 1988 to its decommissioning in April 1990. He reported as Commander, NAVSPACECOM, Dahlgren, Virginia in May 1990.

RADM Allen's other operational assignments have included tours with fighter squadrons VF-41 and VF-1. He made two deployments with VF-41 in USS INDEPENDENCE (CV 62) as part of the Sixth Fleet in the Mediterranean. He was assigned to VF-1 upon the squadron's commissioning after serving with the F-14 Fleet Introduction Team at NAS Miramar in 1972. He made the first F-14 operational deployment with VF-1 in USS ENTERPRISE (CVN 65), participated in Operation Frequent Wind, and led the development of F-14 Fleet tactics. In his second tour with VF-1, he qualified as OOD Underway, Command Duty Officer, and Surface Warfare Officer.

Among his shore assignments, RADM Allen reported as Assistant Professor of Naval Science at the University of Texas NROTC unit in July 1970. He completed graduate studies in International Relations, specializing in Soviet Military Affairs under Dr. Walt W. Rostow, and wrote a master's thesis on Twentieth Century Soviet Naval Strategy. He has served as the Administrative Assistant/Aide to the Deputy Chief of Naval Operations (Air Warfare) from May 1976 to June 1978 and as the CNO Air Warfare Analyst for the Office of General Program Planning (OP-90) in 1984. He also attended the National War College, graduating in 1983.

During his aviation career, RADM Allen has accumulated over 3300 flight hours and 1200 landings in 19 different types of aircraft. His awards include the Legion of Merit, two Meritorious Service Medals, Navy Commendation Medal, Navy Achievement Medal, Navy Expeditionary Medal, Armed Forces Expeditionary Medal, and Humanitarian Service Medal.

RADM Allen also received the Navy League's John Paul Jones Award for inspirational leadership in 1990. In addition, he was named as Tailhooker of the Year for 1990 by the Tailhook Association.

RADM Allen is married to the former Mary Linda Bley of Milligan College, Tennessee. They have one daughter, Ashley Elizabeth.



**COL CHARLES R. GEIGER, USMC**  
**DEPUTY COMMANDER**  
**NAVSPACECOM**

The son of COL and Mrs. A. B. Geiger, USMC, COL Geiger graduated from Camp Lejeune High School with his wife-to-be, Carole, in June 1960. He attended Georgia Tech for two years before enlisting in the Marine Corps in February 1962.

After Boot Camp at Parris Island, South Carolina and an initial assignment to what was then A School at NAS Jacksonville, Florida, he reported to Pensacola, Florida for flight training as a Marine Aviation Cadet (MARCAD). He earned his wings in February 1964, was married, and embarked on a long and continuous career in Fighter Aviation.

Upon completion of his second combat tour, COL Geiger spent two years on exchange duty with the Royal Air Force in Scotland. He returned to the United States to attend Amphibious Warfare School in January 1972 and then

returned to college on the Bootstrap Program where he earned a bachelor's degree in aviation management at Auburn University.

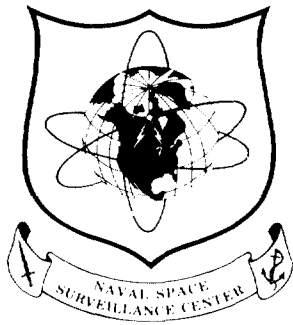
COL Geiger returned to WESTPAC a third time as the Maintenance Officer of a Fighter Squadron. He then attended the Air Command and Staff College and, at the same time, completed work on a master's degree in business administration at Auburn University. Subsequently, he resumed flying as the XO, and ultimately the CO, of his own Fighter Squadron. While CO, he completed his fourth tour in WESTPAC.

In the summer of 1980, COL Geiger reported to HQMC to serve as the first head of the Aviation Safety and NATOPS Branch. He went on to attend the Naval War College where he graduated with distinction. Back in Washington, D.C., he served two years with the Office of the Secretary of Defense, working in Tactical Aviation for Program Analysis and Evaluation.

He returned to WESTPAC for a fifth time as the Commanding Officer of a Marine Fighter Group. Following that tour, he served for two years as the Force Marine for the Commander Naval Air Forces, Atlantic Fleet before reporting to Dahlgren as Deputy Commander for Naval Space Command in July 1989.

COL Geiger's decorations include two Legions of Merit, Distinguished Flying Cross, Bronze Star w/combat V, Defense Meritorious Serve Medal, Meritorious Service Medal, Air Medal with numeral 22, and the Combat Action Ribbon. He has over 2000 hours in the F-4 Phantom and more than 350 combat missions. His most recent flying is in the F/A-18 Hornet and several types of helicopters.

COL Geiger and his wife, Carole, have two sons: Corey is an electrical engineer and Cameron is a second lieutenant in the Marine Corps.



## NAVAL SPACE SURVEILLANCE CENTER (NAVSPASUR)

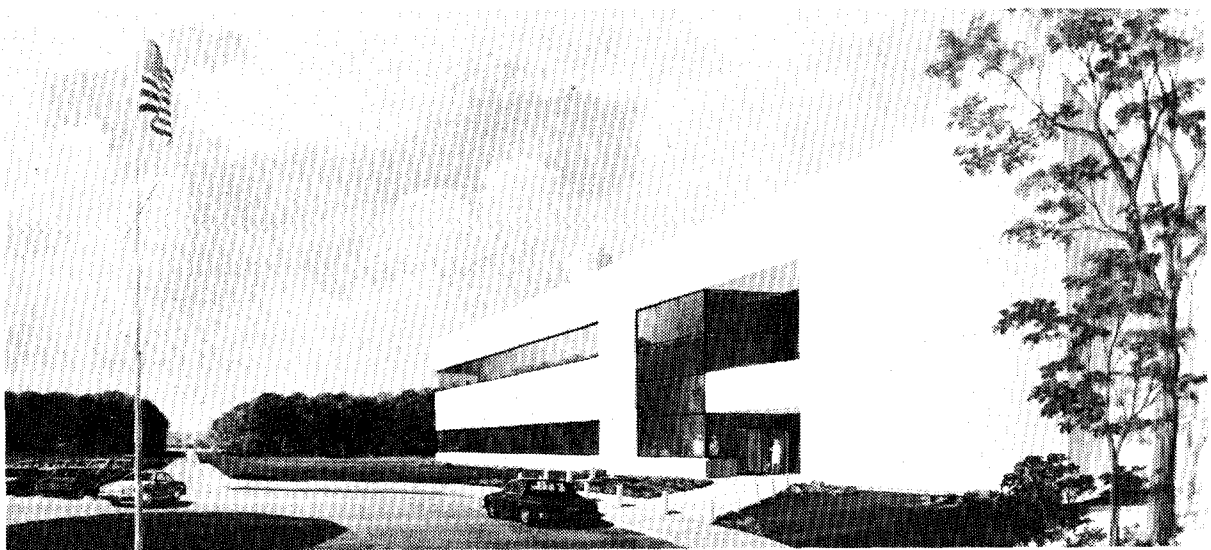
NAVSPASUR was established 1 February 1961. Since that time, it has developed into a space surveillance radar system with multiple transmitters and receivers that span the U. S. NAVSPASUR also receives information from 25 U.S. space sensors worldwide that assist in maintaining a dynamic catalog of over 7000 space objects and their orbits.

As NAVSPASUR grew, so did its missions. NAVSPASUR functions as the Alternate Space Surveillance Center (ASSC) and operates the Tactical Event Reporting System. Its newest mission is to perform the duties of the Alternate Space Defense Operations Center (ASPADOC).

NAVSPASUR is an Echelon 3 command under Commander, Naval Space Command (COMNAVSPACECOM). NAVSPASUR provides space systems information support to the maritime forces of the U.S. and its allies. A variety of data products are provided to the Fleet and to shore commands to counter space threats and to better utilize space-associated tactical information.

NAVSPASUR reports to the Commander-in-Chief, U.S. Space Command via COMNAVSPACECOM. Acting as a sensor for the Space Surveillance Network (SSN), NAVSPASUR provides satellite observations, orbital elements and look-angles to the U.S. Space Command Space Surveillance Center located in Cheyenne Mountain, Colorado Springs, Colorado. Since December 1984, NAVSPASUR has functioned as the ASSC, exercising backup command and control of the SSN. This requires the receipt, processing, analysis, and distribution of data from the SSN.

COMNAVSPACECOM was assigned operational control of the Tactical Event Reporting System in October 1985 and the day-to-day administration and operations were delegated to NAVSPASUR. NAVSPASUR then established communications and processing capabilities and was operational in that capacity by June 1986.



*Artist's conception of new NAVSPASUR building*

On 21 November 1986, USCINCSpace designated NAVSPASUR the ASPADOC with the mission to monitor all space events and to inform all U.S. system operators of potential impacts to their satellite systems.

Most recently, NAVSPASUR began a new service to the Fleet — it is providing CINCLANTFLT and CINCPACFLT charlie elements (one-line ephemeris data) on selected satellite systems via the Joint Operational Tactical System (JOTS). This results in a decrease in the amount of AUTODIN traffic and faster delivery of vital information to naval units.



NAVSPASUR personnel man the alternate Space Surveillance Center (ASSC)

## MANPOWER/BUDGET

NAVSPASUR's personnel and budget have continually grown commensurate with the command's increased responsibilities. Present manpower at NAVSPASUR consists of 152 civilians (55 scientists and engineers, 34 technicians, 47 managers/administrators, 8 clerical personnel, and 8 secretaries). There are 21 officers and 51 enlisted military personnel.

## NAVSPASUR'S DEPARTMENTS

**Analysis and Software** (*Department Head: Diane Leite*)—Provides the mathematics and physics support required to determine satellite orbits and to compute the numerous

orbital data products required by Naval and other DoD forces. It develops and maintains software for all operational NAVSPASUR computers.

The Systems Division installs and maintains computer operating systems and develops and maintains communications software. The Applications Division develops and maintains the software required to satisfy NAVSPASUR's basic missions (i.e., Space Surveillance, Fleet Support, ASSC, and ASPADOC). The Special Projects Division provides mathematical modeling of satellite-related applications and supports the other divisions in projects that require extensive developmental efforts.

**Automatic Data Processing** (*Department Head: Kenneth D. St. Clair*)—Operates and is responsible for error detection on the CDC CYBER computer systems, two Automatic Digital Data Assembly Systems (ADDASs), and the Space Information Management System (SIMS). It controls and maintains the data flow lines to and from the field stations, establishes operator procedures, and ensures the training of operators. The computer system is operated 24 hours, seven days a week to support operational requirements.

**Engineering** (*Department Head: Carroll C. Hayden*)—Responsible for the operational readiness, maintenance, and functioning of the equipment assigned to the field stations and sensor system. It supervises the sensor field stations and is responsible for their technical effectiveness, conducts tests on new or prototype systems, provides technical assistance in analysis studies, and directs the contractor that operates the nine field stations. The department also performs all necessary engineering for the development and integration of new equipment into the field. Engineering oversees the Command property accounting function and Field Station Facilities Management. Recently, it assumed responsibility for the Center MILCON programs and facilities.

**Operations** (*Department Head: CDR Gary R. VanHorn*)—Manned 24 hours by a qualified

Space Surveillance Watch Officer, a Command Duty Officer, and a watch team. Operations Center personnel continually monitor a catalog of 6600 space objects and process all launches, maneuvers, breakups, and deorbits of foreign and domestic satellites. It is responsible for training personnel to ensure sufficient manpower to assume the ASSC and the ASPADOC functions normally conducted by the Cheyenne Mountain Complex, Colorado Springs, Colorado.

Analysts in the department maintain an up-to-date catalog of all space objects. They keep an accurate database on all foreign launches, which enables them to predict future satellite positions and impact points for decaying satellites.

The Intelligence Division maintains all incoming intelligence data, briefs personnel on a need-to-know basis, and establishes liaisons with other intelligence agencies.

**Resources and Administration Services** (*Department Head: David A. Lepard*)—Responsible for the administrative and financial support of NAVSPASUR and its remote detachments. The Administration Services Division assures compliance with command security programs, provides management analysis services, and directs all phases of civilian and military personnel management programs and the Manpower Management Program.

The Fiscal Management Division develops accounting and budgeting operating procedures for the command, advises managers on fiscal policy and procedures, and is responsible for the Command Expense Operating Budget.

**Systems, Plans, and Projects** (*Department Head: W. Leroy Shelton*)—Working to keep NAVSPASUR moving forward; they look to the future—develop new systems to allow the Center to progress with the needs of the increasing missions and responsibilities of NAVSPASUR. Researching cost, site locations, necessary manpower and equipment, support from other commands and agencies, and future needs are only a few of the many

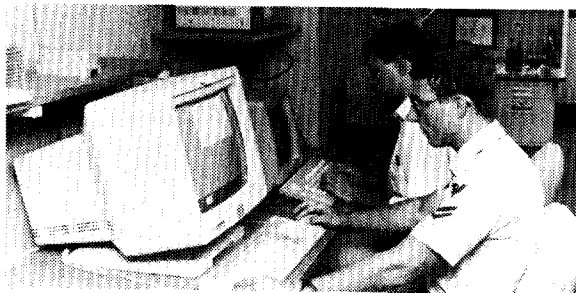
facets of this department. It is currently working on preparing the Center to move to their new building (expected move is FY93), upgrading to a new computer system, installing sensor upgrades, and improving connectivity with the SSN.

## NAVSPASUR'S FIELD STATIONS

The six receiver stations and three transmitter stations located across the U.S. makeup the NAVSPASUR fence. The transmitter stations emit electromagnetic energy in a fan-shaped pattern that spans the continent and extends into the atmosphere to a height of 15,000 miles. As a satellite crosses the fence, energy is reflected back to the receiver stations and is picked up by specifically configured antenna. This energy is transferred into data and is transmitted via leased landlines to the ADP facility in Dahlgren. Currently, the day-to-day operation, maintenance, and staffing of the field stations are under contract to FKW, Inc., Oklahoma City, Oklahoma.

## NAVSPASUR'S DETACHMENTS

NAVSPASUR's two detachments provide Tactical Event Reporting System (TERS) information to the TERS Division: Detachment Buckley, Peterson AFB, Colorado Springs, Colorado (LT Cheryl Sponholtz, Officer-in-Charge); Detachment Echo, Woomera, Australia (LT Patrice Cole, Officer-in-Charge).



NAVSPASUR operations center is manned around the clock



**CAPT HORATIO W. TURNER IV, USN**  
**COMMANDING OFFICER**  
**NAVSPASUR**

CAPT Turner entered the Navy through the NROTC program at Princeton University. He was commissioned upon graduation in June 1967. He completed flight training and was designated a Naval Aviator in August 1968.

CAPT Turner began his aviation career flying the SH-3 Sea King helicopter in HS-4 and HS-8, with two WESTPAC deployments. Next came shore duty in HS-10, with temporary assignment to HS-8 for a 1972 WESTPAC deployment, followed by temporary assignment to COMFAIRWESTPAC for 10 months to establish a Naval Air Facility at Misawa, Japan.

In 1974, CAPT Turner transitioned to the SH-2 *Sea Sprite* helicopter. He assisted in the establishment of HSL-37 at Barbers Point, Hawaii, first as squadron Operations Officer and then as Officer-in-Charge, HSL-37 Detach-

ment ONE, deploying to WESTPAC and the Indian Ocean in 1976. He then served Commander, Naval Surface Group Mid-Pacific as Air and ASW Officer.

In 1977, CAPT Turner attended the Naval War College Command and General Staff course; he graduated with highest distinction. He was next assigned to HSL-34, NAS Norfolk, Virginia as Safety Officer and Maintenance Officer.

In August 1981, CAPT Turner reported to the Deputy Chief of Naval Operations for Plans, Policy, and Operations (OP-06) in Washington, D.C., where he served as Air Warfare Officer and as primary action officer for Communications, Electronic Warfare, Outer Space, Arctic Warfare, and JCS and Navy wargaming.

CAPT Turner reported for duty as Executive Officer, helicopter Training Squadron EIGHT in January 1984 and, in March 1985, assumed the duties of squadron Commanding Officer. During his tour as Commanding Officer, HT-8 won the CNO Safety Award and the Chief of Naval Air Training Award for training efficiency.

CAPT Turner was next assigned as Executive Assistant to the Director of Operations, U.S. Space Command, in July 1986. In March 1988, he was assigned as Deputy Director of Plans for Space Systems, where he directed USSPACECOM planning for new system requirements and current system upgrades.

During his aviation career, CAPT Turner has accumulated more than 3500 flight hours. His awards include the Defense Superior Service Medal, the Meritorious Service Medal, and the Navy Commendation Medal (two awards). He holds subspecialties in Space Operations, Political Military Affairs, and Antisubmarine Warfare and is a proven joint specialist.

CAPT Turner is married to the former Penelope McCord Watson of San Antonio, Texas. The Turners and their children, Alexandra and Ridge, reside in Dahlgren, Virginia.



**CDR ROBERT C. KING, USN**  
**EXECUTIVE OFFICER**  
**NAVSPASUR**

CDR Robert C. King entered the Navy through the NROTC Program at the University of South Carolina. He was commissioned upon graduation in June 1970 and entered the Surface Fleet.

CDR King began his career as a Deck Officer and, later, Auxiliaries Officer on USS RALEIGH (LPD 1), homeported Norfolk, Virginia with operational deployments to the Mediterranean and Northern Europe. His next assignment was as Gunnery Officer aboard USS WAINWRIGHT (DLG 28), homeported Charleston, South Carolina with operational deployments to the Mediterranean, Northern Europe, and Arctic Circle.

In January 1974, CDR King entered the six-month Mine Warfare Staff Planner curriculum at the Fleet Mine Warfare Training Center, Charleston followed by assignment as Executive Officer of USS ILLUSIVE (MSO 448).

In October 1976, CDR King entered the six-month Surface Warfare Department Head curriculum at SWOS School, Newport, Rhode Island. At completion, he was assigned as Operations Officer, USS VALDEX (FF 1096), homeported Charleston with operational deployments to West Africa, South America, and Northern Europe.

In June 1979, CDR King reported to Commander, Destroyer Squadron TWO, homeported Norfolk as Combat Systems Officer and, later, Administration/Personnel Officer. He was next assigned to the staff of Commander, Operational Test and Evaluation Force, Norfolk for the T&E of Gun Weapons Systems (5-Inch Semiactive Laser-Guided Projectile, 76mm Ammunition, CIWS, 16-Inch Improved Cargo Munitions, 25mm Chain Gun, and the Seafire Laser Director). He served as the Navy representative for the Joint Service Small Arms Program and as a member of the Joint Technical Coordinating Group for munitions effectiveness.

In October 1983, CDR King attended the Senior Officer curriculum at the U.S. Army War College, Carlisle Barracks, Pennsylvania. Upon graduation in June 1986, he reported to the Staff of Commander, Naval Space Command, Dahlgren, Virginia.

CDR King holds a BS from the University of South Carolina and an MA from Central Michigan University. His awards include the Navy Commendation, Navy Unit Commendation, National Defense Service Medal with Bronze Star, Sea Service Deployment Ribbon, and Permanent Expert Rifle and Pistol Medals. He holds four Pistol Excellence-in-Competition Badges, four Rifle Excellence-in-Competition Badges, and is designated a U.S. Navy Distinguished Pistol Shot. CDR King holds subspecialties in Space Operations and Weapon Systems Technology and is designated Surface Command Qualified.

He is married to the former Priscilla Louise Kimball of New Orleans, Louisiana. The Kings and their children, Emily and Charlotte, reside in King George, Virginia.





**DR. STEPHEN H. KNOWLES**  
**TECHNICAL DIRECTOR**  
**NAVSPASUR**

Dr. Stephen H. Knowles, a native of New York City, graduated from Amherst College cum laude in 1961. After graduation, he began his government career at the Naval Research Laboratory (NRL). Dr. Knowles studied for his doctorate while employed at NRL and received his Ph.D. in astronomy from Yale University in 1968 with a specialization in celestial mechanics.

His career includes 25 years spent at NRL in the Space Science Division, where his research included investigations in the fields of radar astronomy, radio astronomy, and signal processing. He devoted two years (1974 to 1976) to related research in Sydney, Australia.

Dr. Knowles reported to NAVSPASUR in September 1986. He resides in Woodbridge, Virginia.



## AEGIS TRAINING CENTER (ATC)

The mission of ATC is to train Naval personnel in the maintenance and operation of the highly sophisticated AEGIS Combat System. ATC, which is a tenant command of NSWC at Dahlgren, was commissioned in November 1985. It includes subordinate training units at Moorestown, New Jersey; Wallops Island on the eastern shore of Virginia; Norfolk, Virginia; San Diego, California; Bath, Maine; St. Inigoes, Maryland; Mayport, Florida; Pascagoula, Mississippi; Pearl Harbor, Hawaii; Long Beach, California; and Yokosuka, Japan.

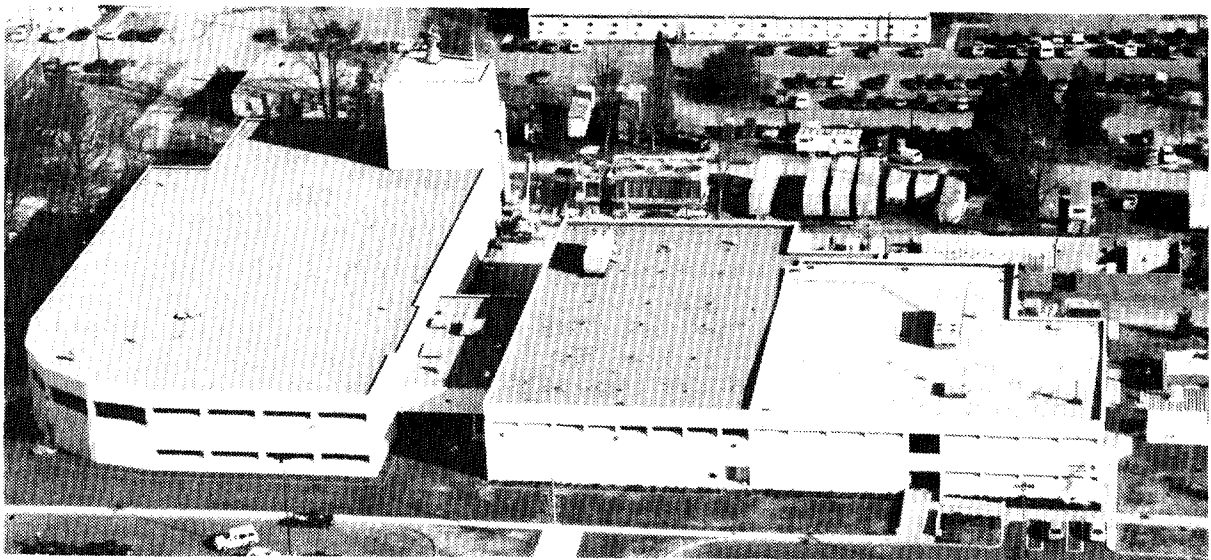
We currently have over 170 active duty Navy instructors, staff, and support personnel and average about 134 Navy students. Both of

these numbers are steadily increasing. We also employ 42 civil service and many civilian contract personnel. By the end of the year, the naval instructional staff is expected to reach 245 and the average daily student population will be about 140. We expect that in 1991 alone, some 590 students will pass through our school.

Our existing facility has more than doubled in size. A ribbon-cutting ceremony on our new multimillion dollar, 78,000-square-foot building was conducted in July 1990 and the building is now fully supporting training.

The AEGIS Combat System represents the Navy's state of the art—radars and other sensors, computers, displays, weapons, and, above all, people woven to support a ship's mission and that of the Navy and the nation. After completing intensive and lengthy hands-on training, each student becomes a vital part of his ship's Combat System Team.

Students are here from 4 to 27 weeks, depending on their specific instructional requirements. Most long-term students have already had a year of intense naval technical schooling before they arrive; they represent the cream-of-the-crop in terms of intelligence and motivation.



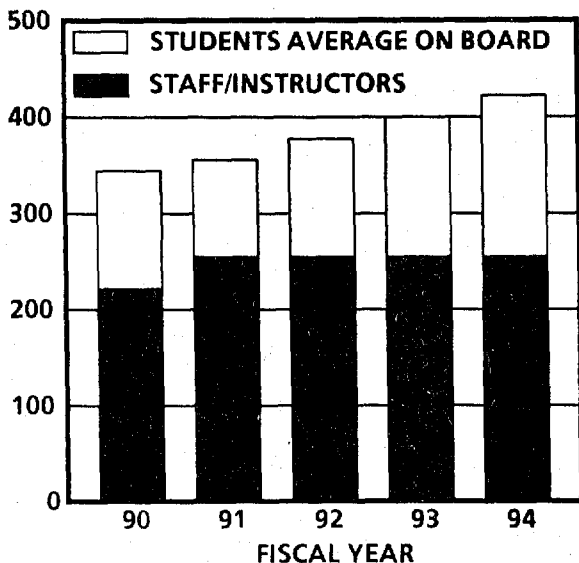
*AEGIS Training Center (ATC)*

At week's end, these students often seek off-base recreation in the area or in nearby communities. About one-third of them are married and bring their families with them; therefore, they need short-term rental housing. Another third are also married but for a variety of reasons (e.g., children in school) choose to leave their families elsewhere.

The instructional staff members are typically senior enlisted personnel or junior officers who serve a three-year tour-of-duty at ATC. They generally become more involved in the activities of the community (e.g., athletic coaches, volunteer firemen, etc.).

## AEGIS EDUCATION CENTER MANPOWER (STAFF/STUDENTS)

### PERSONNEL



## ATC BUILDING EXPANSION

### DDG/Baseline 4 Training

- 78,000-Square-Foot Building
- 22 12-Man Classrooms
- Two 24-Man Classrooms
- Seven Laboratories
- One Multipurpose Lecture Hall
- AN/SPY-1B Radar System
- Library
- Offices and Support Facilities
- Projected Cost \$9M
- Start Construction--February 1989
- Ready for Training--January 1991

## FINANCIAL IMPACT (\$M)

	FY91	FY92	FY93
Staff	2.6	2.8	3.1
Civil Service	1.6	1.7	1.9
Students	3.7	4.0	4.0
Contracts	3.5	5.0	9.6
MILCON	8.2	0.0	0.0
Activation	7.0	7.0	6.0
<b>Total</b>	<b>26.6</b>	<b>20.5</b>	<b>24.6</b>

## WHERE WE LIVE

	Personnel	Dependents
Dahlgren/ King George	303	347
On Base	236	232
Off Base	67	115
Fredericksburg/ Spotsylvania/ Stafford	18	22
Colonial Beach	29	55
Southern Maryland	17	26
Other	16	27
<b>Total</b>	<b>383</b>	<b>477</b>

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## USS ARLEIGH BURKE (DDG 51)

USS ARLEIGH BURKE was named for ADM Arleigh A. *Thirty-One Knot* Burke, USN (Ret), who commanded Destroyer Squadron 23 during World War II. It was launched on 16 September 1989 and is the first of 29 AEGIS Guided Missile Destroyers requested by the U.S. Navy (13 have been contracted). The ship is fitted with the AEGIS Combat System and is designed to provide Anti-air Warfare (AAW), Anti-surface Warfare (ASUW), and Anti-submarine Warfare (ASW) support utilizing an array of the latest computer-guided sensory and attack systems.

ATC is responsible for the training of the highly specialized technicians and operators needed to maintain and operate the AEGIS Combat System. The new destroyer is scheduled for completion in January 1991 and commissioning on 4 July 1991. It will have a complement of 26 officers and 315 enlisted men.



**CAPT SHELDON L. MARGOLIS, USN**  
**COMMANDING OFFICER**  
**ATC**

CAPT Sheldon L. Margolis, Commanding Officer of ATC, is originally from Baltimore, Maryland. He assumed command on 27 January 1987 after serving at the Naval Sea Systems Command, Washington, D.C.

After graduation from Rensselaer Polytechnic Institute under the Naval Reserve Officer Training Corps program, he served in several ships and technical shore assignments. He received his master's degree in Electrical Engineering from the Naval Postgraduate School, Monterey, California. CAPT Margolis had command of USS LYNDE MCCORMACK (DDG 8) from August 1983 through 1986.

CAPT Margolis holds the Bronze Star with Combat V, the Purple Heart, the Meritorious Service Medal, the Navy Commendation Medal, the Combat Action Ribbon, and various campaign and service medals.

He is married to the former Elizabeth Koeber of Pitman, New Jersey. They have two children, Samantha Dyan and Scott Harrison.



**MR. LUKE H. MILLER**  
**TECHNICAL DIRECTOR**  
**ATC**

Mr. Miller was born in San Angelo, Texas. He graduated from The University of Texas at Austin, earning a B.S. degree and a commission in the U.S. Navy. He later received an M.S. degree in Computer Science from the Naval Postgraduate School.

He served in a variety of afloat billets during his naval career and was designated a Proven Subspecialist in Command, Control, and Communications. Mr. Miller was the U.S. representative to NATO for Navy Tactical Data System (NTDS) data extraction/data reduction and Program Manager for the NTDS Model 4 system development effort. Later, he became Project Officer for Restructured NTDS. He then directed operation of the nation's largest space surveillance radar system and was awarded the Navy Meritorious Service Medal.

After completing his naval career, Mr. Miller joined private industry. He authored a document for CNO (OP-943) that identified near-term and out-year requirements for space surveillance system capability. He was a Project Engineer in the Ocean Surveillance Information System Baseline Upgrade (OBU) program and later became the OBU support services Project Manager to the Naval Space and Warfare Systems Command. Mr. Miller furnished engineering services to NAVSWC and the AEGIS Training Center, supporting the planning and engineering of the Combat Systems Laboratory, AEGIS Combat Systems Center, and AEGIS Education Center.

Mr. Miller was selected as Technical Director, ATC, in 1987. He and his wife, Cindy, make their home in King George.